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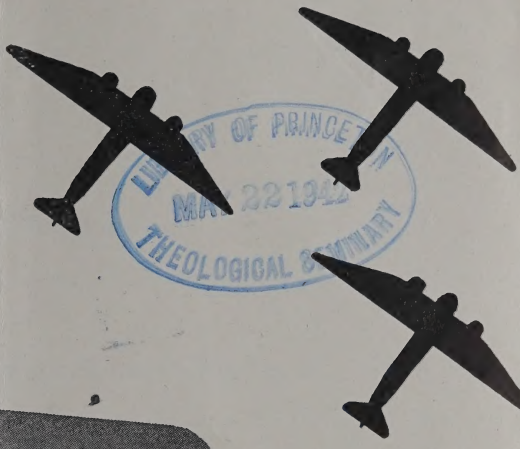

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Pre-AVIATION-CADET TRAINING in HIGH SCHOOLS

Leaflet No. 62

Federal Security, Agency, U. S. OFFICE OF EDUCATION

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FOREWORD

THE manuscript for this statement on **Pre-Aviation-Cadet Training in High Schools** was prepared by Carl A. Jessen, Senior Specialist in Secondary Education, and David Segel, Consultant in Tests and Measurements, in the U. S. Office of Education. In its development they have had valuable assistance from the following committee:

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Individually and as a committee these persons have advised with the authors and have examined the material in the various stages of its preparation. Special mention should be made of the important contributions of Lt. Comdr. Brimm and Lt. Col. Donovan who, in addition to general advice and reaction to the manuscript right up to its final revision, made possible the many necessary contacts with Army and Navy personnel.

In addition to members of the committee, the following have given valuable suggestions regarding the statement:

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Appreciation is hereby expressed to these and many others who have contributed in one way or another to this first publication of the project for pre-training of aviation cadets. Other publications on this subject will follow.

John W. Studebaker

U. S. Commissioner of Education.

PRE-AVIATION-CADET TRAINING IN HIGH SCHOOLS

The Army and Navy Need Flight Personnel

The Army and Navy need candidates for air cadet training to keep pace with the accelerating production of planes. To fill an estimated quota for the current year of 100,000 air cadet trainees needed in addition to those who already are candidates, the Army and Navy are turning to the physically qualified youth in this year's high-school graduating class and those who were enrolled in high school in recent years.

The need at present is especially for air pilots in the Navy, and for pilots, bombardiers, and navigators in the Army—the flying personnel. Whenever the term pilot is used in this statement it is intended to include also navigators and bombardiers. The ratio in the number needed at present is: Pilots, 5; navigators, 1; bombardiers, 1.

High schools need to be alert to the contributions which they can make to the training of ground crews. The maintenance of planes is in no way less necessary than the flying of them; both are essential to a well-coordinated and effective air force; both can be trained for in high school; both will be dealt with in later publications. The most pressing need is, however, for flying crews. It is to this subject that the following statement is directed.

Physical Requirements

An air pilot must be physically fit to stand up to the rigors of operating military planes. In the first place this requires youth; candidates for training as aviation cadets in the Navy must be between their 19th and 26th birthdays, in the Army between their 18th and 27th birthdays. In order to make sure that those accepted for aviation cadet training have the physical potentialities to make good flyers both the Army and the Navy have very stringent physical requirements for admission to training.

The Navy requirements are listed in the **Manual of the Medical Department,** Section XXIII. While the stipulations cannot be summarized in this brief statement the following can be mentioned as basic requirements, failure in any one of which will be cause for rejection on physical grounds:

Normal vision 20/20 each eye, unaided by glasses.
Normal hearing.
Normal color vision.
Minimum height requirements 64 inches, maximum height requirements 76 inches.
Minimum weight requirements 124 pounds, maximum weight requirements 200 pounds.
Minimum blood pressure, systolic 105, maximum systolic 135.
No history of asthma or hay fever.
Freedom from rupture or evidence of abnormal relaxed rings, conducive to rupture.
Minimum of 18 sound teeth, 2 of which shall be opposing molars.

The recruiting manual for aviation cadets in the U. S. Army gives the following requirements:

Visual acuity 20/20 bilateral.
Normal color vision.
Unimpaired ocular muscle balance.
Unimpaired optical organism, anatomically and mechanically.
Good respiratory ventilation and vital capacity.
Hearing 20/20 each ear.
A stable equilibrium.
A sound cardiovascular system, nervous and organic.
A well-formed, well-adjusted, and coordinated physique.
Height, minimum 60 inches, maximum 76 inches.
An integrated and stable central nervous system.
A minimum of 12 teeth, 3 pairs each of serviceable, natural, opposing incisors and masticating teeth.

While the Army and the Navy are the only agencies that can determine with finality whether or not an individual can be accepted for aviation-cadet training, it is possible for a family or school physician to examine those desirous of becoming military pilots to ascertain if

they have physical deficiencies which would almost certainly cause rejection; no young man whose physical condition clearly indicates that he cannot be accepted for flight training should be led to believe that he is getting pre-flight training in high school. Moreover, a physical examination may make it possible to correct some defects of a temporary nature, such as, diseased tonsils, underweight or overweight, dental defects, and the like.

Mental Requirements

The Army and Navy require screening tests for entrance into their flight training classes. These have not been equated to mental age score and I. Q's. These screening tests are necessary because of the need for aviation cadets who can learn easily and quickly those phases of science and mathematics connected with aviation. In order to save the high schools time in attempting to train students who will either fail the high-school courses in air physics and mathematics or later the training in the Army and Navy, high schools should consider carefully the mental qualifications of the boys who are candidates for the pre-flight physics and mathematics training recommended in these pages. Actual prerequisites of mathematics courses are desirable. The boys who have made above-average marks in these subjects may be encouraged to enter such classes if they also possess the physical qualifications. Boys who have not had physics or mathematics should be allowed to enter these classes, if through examination, with both verbal and non-verbal aptitude tests, they have shown that they are capable students.

The U. S. Office of Education will send lists of appropriate tests for this purpose to those who are interested.

The Training Program and the High-School's Part in It

After being accepted the aviation cadet is given 40 weeks of intensive training by the Army, 44 weeks (which is soon to be raised to 48 weeks) by the Navy. During this period the trainee is put through a rigorous program of physical conditioning, military drill, mathematics, physics, meteorology, air navigation, code, theory of flight, gunnery, and, of course, flight training with various other subjects related to maintenance and flying of military planes. The training program changes from time to time, but the over-all plan at present is approximately as described.

It will be observed that some of this training program can be carried

out before entrance as an aviation cadet. In proof of this fact it may be pointed out that some high schools have developed pre-flight training courses. It is felt by those in charge of the training of military aviators in the Army and Navy that many more high schools can assist in this program and will be eager to do so. It is for those who have this interest that this manual has been prepared.

Owing to the great need, it is urged that those high schools in position to do so offer pre-flight training before the end of the present school year and during summer school. No one expects that the courses so offered can be complete, but something can be done in the areas of physical fitness, mathematics, and physics. Some schools may find it possible to offer work also in other subjects, such as, meteorology, International Morse Code, and plane nomenclature and recognition; [1] but high schools generally are equipped to offer the three subjects first mentioned.

Army Air Force Immediate Service
Army Air Force Enlisted Reserve
Navy V–1 and V–5 Programs

THE Army and the Navy have developed the above-named plans for securing aviation personnel. The courses of training suggested in this leaflet are pertinent to all of these plans. Those young men who enlist under any of the three plans named above will find that excellent physical condition and a good working knowledge of mathematics and physics will be among their most valuable assets.

It is understood, of course, that no boy who elects to take pre-flight training courses in high school is thereby obligated to pursue flight training in the armed forces. Those interested in enlisting as aviation

[1] Those interested in thus expanding their courses will find the following references useful:
1. For Meteorology:
CAA Bulletin No. 25. Meteorology for Pilots—B. C. Haynes, Civil Aeronautics Administration, Department of Commerce, Washington, D. C.
2. For International Morse Code:
Secure publications from American Radio Relay League, Hartford, Conn.
3. For Plane Nomenclature and Recognition:
Scale Model Aircraft Construction Procedure—Robert W. Hambrook. U. S. Office of Education, Federal Security Agency, Washington, D. C.

cadets should apply to the appropriate agencies in the Army and Navy. For the Army these are known as Aviation Cadet Selection Boards; they are located in the principal cities and may be reached through the local Selective Service Board. For the Navy the agency is the Naval Cadet Selection Board, which has representatives at every Naval Reserve Base; local Navy Recruiting Stations can supply the address of the nearest Naval Reserve Base.

The following administrative arrangements are suggested as practicable for short courses during the next 4 or 5 months:

I. A short course of a month or 6 weeks to be offered to qualified seniors and recent graduates before the end of the present school year.

It is assumed that any boy who elects to take this special course in physical education, mathematics, and physics will give full time or approximately full time to it (although some of the work may have to fall outside of school hours) and will be excused from attending other classes. The short time available before the end of the school year may make it necessary to lengthen the periods and probably the school week. It would seem that effective work in such a short course will be fully as significant to the education of these seniors as continuation of their regular subjects up to the day of graduation. Many high schools are granting diplomas to seniors who leave before graduation to enter the armed forces. The suggestion is ventured that the short course here outlined may be considered the equivalent of regular subjects for the granting of high-school credit, for the issuance of a diploma, and for college entrance.

II. A summer-school course of from 6 to 12 weeks offered to recent graduates and drop-outs.

Since this suggestion is probably more appropriate for large than for small schools the summer-school plan ought to include the provision that young men from neighboring communities may be admitted tuition-free insofar as they can be accommodated; in some cases a number of communities may want to enter into a cooperative arrangement to share the expense of a summer short course in pre-aviation-cadet training. The granting of credit and the provision for longer periods, already discussed under "I", may well apply to the summer-school course.

The instruction in these short courses, whether in the present school year or in the summer or both, may be supplied by teachers of physical education, mathematics, and physics. This may involve upsetting some schedules, but many schedules are being upset in this period of emergency. In some communities it may be possible to secure former teachers who will be interested in doing their bit by taking over some of the instruction in the short courses. The physical education teachers should be men, but there is no good reason why women should not teach the mathematics and physics courses. Care should be exercised that the teachers selected are well qualified both by academic preparation and by temperament to do the job competently.

By way of supplying assistance to administrators and teachers desiring to introduce pre-flight training in the present semester or during the summer, the following outlines of content in mathematics, physics, and physical education have been prepared. In their preparation the U. S. Office of Education has had the advantage of access to the courses in mathematics and physics used by the Army and the Navy in the early stages of flight training. The courses in the two services are not identical, but they are similar in that they stress basic mathematics and physics with special applications to air navigation. While the armed forces will need to supplement the high-school training, it will be advantageous if the essentials in mathematics and physics have been mastered by the trainees before they become aviation cadets. Ultimately these fundamentals must be mastered by those who wish to fly military planes. The more knowledge of these subjects a candidate possesses, the more advantages he will have in:

1. Passing the "screening" test for admission.
2. Succeeding in the exacting course of training to which he is subjected after being accepted as an aviation cadet.
3. Developing into an efficient pilot of military planes.

The effort in preparing the outlines has been centered upon giving a correct conception of content. Addressed, as the statement is, to those trained to teach these subjects, no attempt is made to discuss teaching methods.

Mathematics

The Army and Navy require that their flying personnel should have a good and functioning basic training in mathematics. Because so many of the trainees do not have adequate mathematical background for flying, both the Army and the Navy spend valuable time giving them this training, a training which the high schools are entirely competent to supply. By this is not meant that all high schools and mathematics teachers are equipped to supply all the mathematics needed in so specialized a function as flying a military airplane; the fundamental elements of mathematics upon which the specialized training is based, and without which it cannot be successful, can be given in high schools by high-school mathematics teachers.

For those prospective aviation cadets who have taken a number of mathematics courses, the training will be largely a matter of review. Even for these, however, the pre-aviation mathematics course will not be without its challenge; the armed forces demand far more than 75

percent accuracy, they require a celerity in mathematical operations far beyond that expected in the usual high-school course, and they need men who have enough facility in mathematics to perform many of the operations mentally and under the most trying conditions.

Those who have not taken a good deal of mathematics in high school will find it extremely difficult to succeed without pursuing preliminary training in mathematics.

The Navy Department's Course in Mathematics

The Navy employs as text A. E. Downer's **Practical Mathematics of Aviation** (Pitman Publishing Corporation, New York and Chicago, 1939). Under the 24-period course now in operation the time allotment to different elements in the textbook is as follows:

Topic	Periods allotted
Arithmetic review	2
Equations	1
Formulas	4
Graphs	2
Ratio, proportion, and percentage	1
The right triangle	4
Simple mechanics	3
Miscellaneous problems	2
Review	1
Examinations (periods 6, 12, 18, and 24)	4
Total	24

It will be seen from the above time schedule that a cadet who does not have a good working knowledge of mathematical processes is likely to encounter considerable difficulty in covering the course in 4 weeks concomitantly with his assignments in drill and physical training, radio code, aerology, aircraft indoctrination, physics, and fundamentals of naval service.

The following general description of the Applied Mathematics course is quoted from the Ground Training Syllabi of the Navy Department:

Arithmetic: Adding, subtracting, multiplying, dividing of whole numbers, decimal fractions (hours, minutes, seconds), and (degrees, minutes, seconds).

Equation and Formulas: Solving equations of first power and simple quadratics with an unknown. Substituting values in formulas and solving for unknown in such types as areas, volumes, lift equation, drag equation, and horsepower equation.

Graphs and Charts: Plotting of graphs relative to airplane and engine operation from data. Interpretation of the meaning of curves. Plotting simple vectors and elementary vector analysis.

Ratio, Proportion and Percentage: Computation of gear train and lever ratios. Proportional sizes of parts as scaled in drawing. Computation of percentage and efficiencies and interpretation of meanings of percentage values in terms of fractions.

Geometry: Solution for sides of a right triangle by arithmetic. Use of protractor and computation using degrees, minutes, seconds. Omit Trigonometry. Definitions of geometric shapes and terminology.

The War Department's Course in Mathematics

The War Department has prepared a technical manual entitled **Mathematics for Pilot Trainees** (TM 1–900) under date of March 1942. This manual covers the material in mathematics which it is required that an aviation cadet must know before he can go on with more specialized flight training. The manual is now in the hands of the printer and will be available for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at 10 cents a copy. The following listing of section headings and principal subheads will indicate the material included:

Section I. General.
Purpose.
Scope.
Materials.

The following quotation reveals the scope o the manual: "Briefly, the scope includes the elementary operations of arithmetic, such as, addition, subtraction, multiplication, and division, percent, ratio and proportion, angular measurements, scales, the use of graphs and formulas, and the graphical solution of the more common problems involving the triangle of velocity."

Section II. Fundamental Operations.
Addition.
Subtraction.
Multiplication.
Division.
Conversion of decimal fractions to common fractions.
Conversion of common fractions to decimal fractions.
Addition and subtraction of fractions.
Multiplication of fractions.
Division of fractions.
Ratio and proportion.
Positive and negative numbers.

Addition of positive and negative numbers.
Subtraction of positive and negative numbers.
Multiplication and division of positive and negative numbers.
Miscellaneous exercises.

Problems are an important part of the course. There are 10 or more problems included under each of the subheads listed here; the "miscellaneous exercises" at the end consist of 40 problems. Many of the problems are related to aviation (fuel supply, horsepower, revolutions per minute, air speed, alloys, gear ratios, etc.) but the stress throughout is upon (1) understanding the principles taught and (2) performing the operations **accurately** and **quickly.**

As may be judged by the list of topics, there is nothing especially involved or difficult in the section, nothing that is not taught in arithmetic and algebra courses. Decimals are used extensively in the problems and the importance of locating the decimal points correctly is emphasized. Squaring and cubing of numbers is taught with multiplication; mixed numbers and their conversion into fractions, with division; multiplying or dividing both numerator and denominator of a fraction by the same number without changing its value, including simplification, in connection with conversion of decimal fractions to common fractions; percentage and conversion of decimals to percentages and vice versa in the same connection. Similarly expression of common fractions as percentages is included with the conversion of common fractions to decimal fractions. The fundamental operations with fractions include treatment of mixed numbers as well. Substituting letters for quantities is introduced in the study of proportion and conversion of $\frac{a}{b}=\frac{c}{d}$ into $ad=bc$ is taught. About half of the pages of the manual are given to Section II.

Section III. Equations and Formulas.
Purpose.
Scope.
Equations.
Axioms used in solving equations.
Miscellaneous exercises.

The equation is defined and the student is given 10 statements which he is required to translate into equations. Effort is made to drive home the axiom that equal quantities may be added to, subtracted from, multiplied by, or divided into both sides of an equation, without violating its validity as an equation. Transposition is taught. Ten problems are given for solution by formula; these problems acquaint pupils with formulas related to aviation, such as, lift of an

airplane, horsepower required for flying an airplane, the general gas law, conversion of temperature readings from Fahrenheit to Centigrade scale, propeller diameter for maximum efficiency, etc. At the end are 20 miscellaneous problems involving the use of equations and formulas.

Section IV. Scales.

Scope.
Models.
Maps.
Miscellaneous exercises.

Problems are based principally upon the use of the scale, 1 to 72, in building scale model aircraft, and upon aeronautical charts and maps—sectional charts being drawn on a scale of 1 to 500,000 and regional charts 1 to 1,000,000. Ten problems are offered on models and aeronautical charts.

Section V. Graphs.

Purpose and use.
Reading graphs.
Construction of graphs from data.

Five problems are presented on reading of a pressure-temperature graph of a gas at constant volume. The 24-hour system for stating time is explained and seven problems in reading sunset graphs are given. Practice in plotting graphs from data is provided on air speed—fuel consumption; temperature—time; calibrated air speed (knots)—indicated air speed (m. p. h.); leng of pendulum (inches)—vibration time (seconds); Centigrade scale—Fahrenheit scale.

Section VI. Angular Measurement.

Purpose.
Angles and units of angle measurement.
Course, heading, drift.
Exercises.

Measurement of circles is explained—degrees, minutes, seconds. Major emphasis is placed upon measurement of angles and the use of a protractor. The problems on true course, true heading, and drift are somewhat technical, and had probably better not be attempted unless the teacher is versed in aviation mathematics; but there is nothing technical about the fact that a plane is driven off its course by a side wind, and that correction must be made for the angle of "drift" between its "true course" and its "true heading." Thirteen exercises are given.

Section VII. Vectors.
Purpose.
Vector.
Triangle of velocity.
Miscellaneous exercises.

This section also is somewhat specialized and had better in its specialized aspects be reserved for the later aviation cadet training in the Army unless, as suggested, the teacher has made a study of aviation mathematics. Every teacher of mathematics and physics is, however, in position to teach the resultant of concurrent forces. The prospective aviation cadet who understands the principle and can work problems on concurrent forces will not encounter much difficulty with vector analysis needed in aviation.

Physics

The Army and Navy Air Forces each has a course in the fundamentals of physics which the cadets being trained for flying must take in the first few weeks of their training. The course of instruction is not easy—especially when the time allotted to it is taken into consideration. It has been found particularly difficult for those who have not had previous instruction in physics. It would be exceedingly helpful if the high schools would arrange classes in physics—to be offered during the coming summer, fall, and spring semesters—for those seniors who expect to enter the aeronautical branches of our armed forces. The outline of topics in physics presented here represents the fundamentals prescribed in the Army and Navy training courses in physics and should be profitably taken by any high-school boy who ranks as average or above average in reasoning ability, whether or not he has previously had a course in physics. It would be advisable for seniors who had their regular physics course in the junior year to take up such a course as a review in order to insure their entrance into, and their success in the armed flying schools. The course outlined should be covered in a summer course of 6 weeks if two periods are spent each day, provided the students have the ability and take the work seriously

The course now used in the Army Air School is one which they have developed themselves. It is called **Physics for Pilot Trainees** (TM 1–233). It is now being published and will be available from the Superintendent of Documents, Washington, D. C., at 20 cents a copy.

The course adopted by the Navy follows Black's **An Introductory Course in College Physics,** 1941 Edition, New York: Macmillan

Company. Chapters 1–9, 11, 14–16, 18, 20, 22–24, 27, 29, and 31 are given special emphasis.

The Army course is almost entirely concerned with mechanics, while the Navy course includes about 60 percent mechanics and 40 percent heat, electricity, sound, and light. In the recommended list of topics to be covered in a high-school course, an attempt has been made to stick to the fundamentals which are applicable to what both the Army and Navy want. The last three sections—those dealing with electricity, sound, and light—cover the basic work called for by the Navy course of study; these are omitted entirely by the Army course of study.

The type of instruction recommended in these courses is regular class work without individual laboratory work. Demonstration apparatus should be used sparingly. The main effort should be the attempt (a) to secure so thorough an understanding of, and so great a facility in applying, the various physical principles that the student can use them in all types of situations in actual combat service, and (b) to calculate a great many problems calling for the application of formulas which express the laws of physics. The Army course in physics contains a large number of problems. This approach is recommended for two reasons: (1) because the armed forces are mainly interested in teaching their flying personnel to apply principles and make calculations during flight duty; (2) because with bright students, learning takes place most efficiently if time is spent directly on the thing desired to be learned.

The outline that follows is, in the main, topical. For each topic there may be several laws to be learned. For each of these laws some type of formula or mathematical relationship is indicated. The course of instruction should include a study of the principle, the formulas, and the application of these formulas to situations of various types.

I. Units of Measurement—

Volume. Time.
Weight. Distance.
Density. Velocity.

II. Simple Machines and Balanced Forces—

Levers. Center of gravity.
Principle of movements. Wheel and axle.
Mechanical advantage. Conditions of equilibrium.

III. Laws of Motion—

Newton's laws of motion.
Constant acceleration.
Positive and negative acceleration.

Force of gravity and acceleration.
Centrifugal and centripetal forces.

IV. Work and Power—

Work.
Applications of inclined plane and screws.
Energy.
Power.
Horsepower.
Friction.
Efficiency of machines.

V. Properties of Liquids—

Archimedes' principle.
Buoyancy.
Pressure in liquids.
Specific gravity and density.

VI. Properties of Gases—

Kinetic theory.
Boyle's law.
Charles' law.

VII. The Atmosphere—

Density.
Pressure of the atmosphere.
Application of gas laws to the atmosphere.
Clouds.
Vapor pressure.
Dew point.
Specific humidity.
Relative humidity.
Heating and atmosphere.
Terrestrial and solar radiation.

VIII. Resolution of Forces—

Representation of forces by vectors.
Principle of parallelogram of forces.
Resolution of forces.
Application of resolution of forces to boats and airplanes.

IX. Temperature and Heat—

Thermometer—scales.
Expansion of solids with heat.
Melting, freezing, specific heat, heat of vaporization, and condensation.
Relation of temperature to changes in volume and pressure of gases.

X. Electricity—

Measurement of electrical currents—amperes, ohms, and volts.
Electrical power.
Electrical energy.

XI. Sound—

Fundamental concepts of wave motion in sound.
Velocity.
Intensity.
Reflection.
Refraction.

XII. Light—

Fundamental concepts of wave motion in light.
Velocity.
Reflection.
Intensity.
Refraction.

Physical Education

Both the Army and the Navy lay a great deal of stress on physical fitness and especially so on physical fitness of airplane pilots. The

severe physical requirements for entrance are an indication of this emphasis. So are the time allotments and the types of exercises recommended. In the Navy training program, for instance, more than half of the time of the trainee during the first 12 weeks is given to a combination of physical education, infantry drill, military arts, and radio code.

Neither the Navy nor the Army has issued a manual on physical education specifically for pilots similar in scope to the suggestions available on mathematics and physics. The following comments may be found useful as indicating the character of the physical education work.

In the first place it needs to be borne in mind that these are sturdy healthy young men especially selected because of physical fitness. Consequently they are able to stand a physical training program which would be too severe for most young men even of their age. In the high schools the boys may be somewhat younger and not quite so carefully selected; however, as seniors and recent graduates they will be approaching their 18th birthdays if they have not already passed them; and if a careful selection is made as suggested under "Physical requirements" in this manual those who pass are strong enough to respond to a physical education program much more intensive than that usually offered to high-school pupils.

The armed forces are interested in physical activities which develop strength, endurance, fine coordination, and aggressiveness. Generally speaking the activities should be conducted in the open and should be a regular part of every day's program. The periods also should be long enough (preferably an hour or an hour and a half) to permit of greater continuity and development of endurance than would be characteristic of programs based on shorter periods.

There is every reason for physical education instructors to vary their programs. The following outline of a period of work is offered as suggestive, and suggestive only, of the type of activity which meets the need:

1. A stipulated time for getting dressed for the physical period and reporting to their stations.
2. A 5- to 10-minute warm-up run outdoors broken into jogging and walking. Deep breathing exercises at the end and a few minutes of rest.
3. A 15-minute period of setting-up exercises. In this connection the Navy has developed a program which has been released under the title **Tentative Fitness Program of the U. S. Navy.**

4. As the main activity of the period a program of team games and athletic sports involving competition and as much physical contact as possible without unnecessary risks. **All should participate.** Among the games and sports recommended are: Baseball, handball, touch football, soccer, swimming, water polo, relays, running and jumping, gymnastics, acrobatics, tumbling, wrestling, and boxing. The five sports last mentioned are especially appropriate for aviators since they call for a sense of "whereaboutness" not present in some of the others.
5. A stipulated time for taking showers and getting dressed.

On occasion it may be practicable to plan longer excursions involving hikes, water trips, and overnight camping in the open. The activities should be developed with the idea of challenging ingenuity and endurance; they are not conceived of as excursions providing comforts and conveniences of home.

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“Keep ’em flying”